U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Cochliopa texana*

COMMON NAME: Phantom Cave snail

LEAD REGION: Region 2

INFORMATION CURRENT AS OF: October 2005

STATUS/ACTION**:**

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status
___ New candidate
_X_ Continuing candidate
___ Non-petitioned
_X_ Petitioned - Date petition received: May 11, 2004
_ 90-day positive - FR date:
_ 12-month warranted but precluded - FR date:
_ Did the petition requesting a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)? Yes
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.
During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, emergency listings, and essential litigation-related, administrative, and program management functions. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).
___ Listing priority change
Former LP: ___
New LP: ___
Date when the species first became a Candidate (as currently defined): October 30, 2001

___ Candidate removal: Former LP: ___
___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or

continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Snails, Hydrobiidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Texas

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Reeves and Jeff Davies Counties, Texas

LAND OWNERSHIP**:** 33% federal (Phantom Lake Spring – Bureau of Reclamation); 33% state (San Solomon Spring – Balmorhea State Park, Texas Parks and Wildlife Department); 33% private (East Sandia Spring – The Nature Conservancy). Lands surrounding the spring habitats are all privately owned.

LEAD REGION CONTACT: Susan Jacobsen, 505-248-6641

LEAD FIELD OFFICE CONTACT: Austin Ecological Services Field Office, Nathan Allan, 512-490-0057

BIOLOGICAL INFORMATION

Species Description and Taxonomy: The Phantom Cave snail was first described by Pilsbury (1935). It is a very small snail, measuring only 1 to 1.4 mm in length (Dundee and Dundee 1969). Habitat of the species is found mostly on firm substrates (rocks and vegetation) on the margins of spring outflows (Taylor 1987). These snails likely have life spans of 9 to15 months and reproduce several times during the spring to fall breeding season (Taylor 1987, Pennak 1989, Brown 1991). Snails of the family Hydrobiidae are sexually dimorphic with females being characteristically larger and longer-lived than males. The snails are ovoviviparous, producing live young serially (as opposed to broods). They are presumably fine-particle feeders on detritus and periphyton associated with the substrates (mud and vegetation); Dundee and Dundee (1969) found diatoms to be the primary component in the digestive tract.

In the desert Southwest, aquatic snails are distributed in isolated geographically-separate wetland populations (Hershler et al. 1999). They likely evolved into distinct species during recent dry periods (since the Late Pleistocene, within the last 100,000 years) from parent species that once enjoyed a wide distribution during wetter, cooler climates of the Pleistocene. Such divergence has been well-documented for aquatic and terrestrial macroinvertebrate groups within arid

ecosystems of western North America (e.g., Taylor 1987, Metcalf and Smartt 1997, Bowman 1981). Hershler and Thompson (1992) described the systematics of the Subfamily Cochliopinae, Family Hydrobiidae, based on morphological characteristics.

Historical and Current Range/Distribution: The Phantom Cave snail is an aquatic snail occurring in only three spring systems and associated outflows (Phantom Lake, San Solomon, and East Sandia springs) in the Toyah Basin of Jeff Davis County and Reeves County, Texas (Taylor 1987). The snail may also occur at Giffin Spring, in the same area, but information is not available from that site because access is limited by the private landowner. There is no available information that indicates the species historic distribution was larger than the present distribution. However, other area springs may have contained the same species, but because these springs have been dry for many decades, there is no opportunity to determine the potential historic occurrence of the snail fauna.

Another endemic hydrobiid aquatic snail, Brunes tryonia (*Tryonia brunei*), may also have occurred historically in lateral canals at Phantom Lake Spring (Taylor 1987). A recent study of phylogenetic relationships was unable to relocate this species (*Tryonia brunei*) (Hershler et al. 1999). No confirmed occurrence of this species has been made since the original description by Taylor (1987). Brunes tryonia may now be extinct. An additional endemic hydrobiid aquatic snail, Phantom springsnail (*Tryonia cheatumi*), has essentially the same current distribution as the Phantom Cave snail.

Habitat: The Phantom Cave snail only occurs in desert spring outflow channels. They are most abundant in the first few hundred meters downstream of spring outlets. Habitat of the species is found on both soft and firm substrates on the margins of spring outflows (Taylor 1987). They are also commonly found attached to plants, particularly in dense stands of submerged *Chara* beds.

In addition to rare snails, these springs are also important aquatic habitat for two federally endangered fish species, the Comanche Springs pupfish (*Cyprinodon elegans*) and the Pecos gambusia (*Gambusia nobilis*), and endemic amphipods of the *Gammarus pecos* complex (Cole 1985). These springs are also an important source of irrigation water for the communities in the Toyah Basin, managed by the Reeves County Water Improvement District #1 (District). Phantom Lake Spring is in Jeff Davis County, while the other major springs in this system are in Reeves County.

Population Estimates/Status: Within its limited range, Phantom Cave snails can have very high densities of abundance. These snails likely have life spans of 9 to15 months and reproduce several times during the spring to fall breeding season (Taylor 1987, Pennak 1989, Brown 1991).

Dundee and Dundee (1969) described the conditions of Phantom Cave snail at Phantom Lake Spring in 1968. Despite the fact that Phantom Lake Spring has been drastically altered from its original state, the native snails (Phantom springsnail and Phantom Cave snail) occurred in the irrigation canal in such tremendous numbers that the sides of the canal appeared black from the cover of snails. Today the snails are limited to the small pool at the mouth of Phantom Cave and can not be found in the irrigation canal downstream (J. Landye, *in litt*, 2000). A similar situation

occurs at San Solomon Spring, where Taylor (1987) reported the snail was abundant and generally distributed in the canals from 1965 to 1981. No recent information is available on the status of the species at San Solomon Spring.

In the summer of 2000, East Sandia Spring was surveyed for aquatic macroinvertebrates for the first time. A healthy abundance and diversity of snails and other macroinvertebrates were present in the spring head and small outflow channel (Lang et al. 2003). The entire available habitat is estimated at less than 150 meters (492 feet) in length, and usually 1 m (3 feet) wide or less.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Habitat quality: The most significant threat to the continued existence of this snail is the degradation and eventual loss of spring habitat (flowing water) due to the decline of groundwater levels of the supporting aquifer. The San Solomon Spring System (System) is located in the Toyah Basin at the foothills of the Davis Mountains near Balmorhea, Texas. In addition to being an important habitat for rare aquatic fauna, area springs are also an important source of irrigation water for the farming communities in the Toyah Basin. Phantom Lake Spring is in Jeff Davis County, while the other major springs in this system are in Reeves County. The Reeves County Water Improvement District #1 (District) diverts water from the springs using a system of canals to irrigate area fields (RCWID#1 2001).

Pumping of the regional aquifer system for agricultural production of crops has resulted in the drying of other springs in this region (Brune 1981). Other springs that have already failed include Comanche Springs, which was once a large surface spring in Fort Stockton, Texas. Prior to the 1950s, this spring flowed at more than 1200 liters per second (lps) (42 cubic-feet per second (cfs)) (Brune 1981) and provided habitat for rare species of fishes and invertebrates, likely including aquatic snails. The spring ceased flowing by 1962 (Brune 1981). Leon Springs, located about 40 miles east of Balmorhea, was measured at 500 lps (18 cfs) in the 1930s and was also known to contain rare fish, but ceased flowing in the 1950s following significant irrigation pumping (Brune 1981).

The general physiographic setting of the System is that of a largely alluviated, arid, karst terrain. The aridity of the region restricts the available habitat for spring-dependent species and limits the available recharge to replenish and maintain spring flow. Surface waters in the area that provide habitat for the snails are exclusively supported by spring flows that discharge from groundwater aquifers. Many of the aquifers in west Texas receive little to no recharge (Scanlon et al. 2001) and are influenced by regional flow patterns (Sharp 2001). Management and conservation of these aquifers is the key for ensuring the continued survival of rare species in the spring habitats (Bowles and Arsuffi 1993). Historically, the springs in the System were likely periodically interconnected as portions of the Toyah Creek watershed. In recent times, man-made structures altered the patterns of spring outflows and stormwater runoff from the watershed.

The base flows from springs of the System are likely discharge points of a regional flow system from aquifers associated with the Salt Basin, west of the Delaware Mountains, and Wildhorse Flat, west of the Apache Mountains, Culberson County (Sharp 2001, Sharp et al. 2003, TWDB 2005). The relationships of the supporting aquifers for the springs are not well defined. Studies (White et al. 1938, LaFave and Sharp 1987, Schuster 1997, Sharp et al. 1999) indicate that "base flow" comes from a regional groundwater system, while the springs respond to runoff from the Davis Mountains, sometimes resulting in the flow spikes following rainfall events. Similar water chemistry, water age, and near constant temperatures of about 26 °C (79 °F) among three of the springs (Phantom Lake, San Solomon, and Giffin) indicate that their waters likely originate from the same source of Cretaceous Limestone (Schuster 1997). East Sandia waters are likely a result of shallower, local groundwater sources (Schuster 1997).

An assessment of the springs near Balmorhea by Sharp (2001) concluded:

> The effects of humans on the Toyah Basin aquifer have been significant. Irrigation pumpage increased rapidly after 1945. Many springs in the area have since ceased to flow (Brune 1981). Irrigation pumpage from the Toyah Basin lowered water-table elevations and created a cone of depression. Thus, pumpage totals altered the regional-flow-system discharge zone from the Pecos River to irrigation wells within the Toyah Basin (LaFave and Sharp 1987, Schuster 1997, Boghici 1997). … The Groundwater Field Methods classes found water-level declines near Balmorhea springs of about 20 ft with respect to the 1932 data (White et al. 1938). Recent declines of pumpage for irrigation because of economic conditions have allowed partial recovery of water levels, but it seems doubtful that predevelopment conditions will be achieved."

Ashworth et al. (1997) provided a brief study to examine the cause of declining spring flows in the Toyah Basin. The conclusion from this study suggested that recent declines in spring flows are more likely to be the result of diminished recharge due to the extended dry period rather than from groundwater pumpage (Ashworth et al. 1997). Although certainly a factor, drought is unlikely the only reason for the declines because the drought of record in the 1950s had no effect on the overall flow trend (Allan 2000, Sharp 2001). TWDB (2005) provided a thorough review of the hydrogeology and the regional flow system for the springs that support this species. The complexity of the aquifer system and the limited availability of data results in a high level of uncertainty about the cause of spring flow declines. However, the report concluded that, "Because of the regional scale of the base flow, slow travel time, and the age of the waters issuing from the spring system, we expect that any substantial pumping on the regional flow system will cause a decline in spring flow in the San Solomon Springs system" (TWDB 2005).

P*hantom Lake Spring*: Phantom Lake Spring is located at the base of the Davis Mountains, about 6.4 kilometers (4 miles) west of Balmorhea State Park, just over the Reeves County line in Jeff Davis County. The 6.9-hectare (17-acre) site around the spring and cave opening is owned by the U.S. Bureau of Reclamation (Reclamation). The site includes a 120-meter (394-feet) pupfish refuge canal and is surrounded by an outcrop of limestone cliffs. When water was present from the spring, it was an important site for wildlife, especially small mammals, bats, and birds.

Historically, Phantom Lake Spring was a large desert ciénega with a pond of water more than

several acres in size (Hubbs 2001). The spring outflow is at about 1,080 m (3,543 feet) elevation and previously provided ideal habitat for the endemic native aquatic fauna. Flow from Phantom Lake Spring was originally isolated from the other waters in the system, and the spring discharge quickly recharged back underground before reaching Toyah Creek. Modifications to the spring outflow channeled waters into Toyah Creek, west of San Solomon and Giffin springs (White et al. 1938) for use by local landowners and irrigation by the District. Flows from Phantom Lake Spring have been declining since measurements were taken in the 1930s (Brune 1981) and have not been sufficient to support irrigation by the District for many years. During the 1940s the spring outflow was modified into a concrete-lined irrigation ditch so that the total outflow from the spring could be captured and used for irrigation of agriculture lands (Bogener 2003). The native aquatic fauna persisted, though probably in reduced numbers, in the small pool of water at the mouth of the spring (Phantom Cave) and in the irrigation canals downstream.

Phantom Lake Spring has experienced a long term, consistent decline in spring flows. Discharge data have been recorded from the spring six to eight times per year since the 1940s by the U.S. Geological Survey (Schuster 1997). The record shows a steady decline of flows, from greater than 10 cfs in the 1940s to 0 cfs in 2000. The data also show that the spring can have short term flow peaks resulting from local rainfall events in the Davis Mountains (Sharp et al. 1999). These peaks are from fast recharge and discharge, not surface runoff because the spring is not within a drainage basin. However, after each increase, the base flow has returned to the same declining trend within a few months. The exact causes for the decline in flow from Phantom Lake Spring are unknown. Some of the obvious reasons are groundwater pumping of the supporting aquifer and decreased recharge of the aquifer from drought (Sharp et al. 1999, Sharp 2003).

Exploration of Phantom Cave by cave divers has led to additional information about the nature of the spring and its supporting aquifer. Beyond the entrance, the cave is a substantial conduit that transports a large volume of water generally from the northwest to the southeast, consistent with regional flow pattern hypothesis. Over 2,438 meters (8,000 feet) of the cave conduit have been mapped so far. In addition, flows have been measured and are in the 0.7 cubic-meters/second (25 cfs) range. The relatively small flow at Phantom Lake Spring is essentially an overflow of a larger flow system underground. Waters from Phantom Lake Spring issue at a higher elevation than other springs in the System, resulting in Phantom Lake Spring being the first to be impacted by declining groundwater levels. This situation was predicted by White et al. (1938).

The pupfish refuge canal was built by Reclamation in 1993 (Young et al. 1993) to increase the available aquatic habitat at Phantom Lake Spring. Winemiller and Anderson (1997) showed that the refuge canal, although it was an artificial habitat, was used by endangered fish species when water was available. Stomach analysis of the pupfish from Phantom showed that the snails were a part of the fish's diet (Winemiller and Anderson 1997). The refuge canal was constructed for a design flow down to about 14 lps (0.5 cfs), which at the time of construction was the lowest flow ever recorded out of Phantom Lake Spring. Recent loss of spring flow has eliminated the usefulness of the refuge canal because it is has been dry since the summer of 2000 (Allan 2000).

Phantom Lake Spring ceased flow during the summer of 2000 and has not recovered. All that remains of the spring outflow habitat is a small pool of water, with about 50 m^2 (540 $feet^2$) of

surface area. In May 2001, Reclamation, in cooperation with the U.S. Fish and Wildlife Service (Service), installed an emergency pump to move water from within the cave to the springhead, as a temporary measure to prevent complete drying of the pool. Habitat for the snails at Phantom Lake Spring is now limited to this small pool. Despite the fact that Phantom Lake Spring has been drastically altered from its original state, the native aquatic fauna are maintaining minimal populations there. Hubbs (2001) documented changes in water quality and fish community structure at Phantom Lake Spring since natural flows ceased.

San Solomon Spring: San Solomon Spring, in Reeves County, is by far the largest spring in the Balmorhea area (Brune 1981). It provides the water for the swimming pool at Balmorhea State Park and most of the irrigation water for the District. Balmorhea State Park encompasses about 18.6 ha (45.9 acres) southwest of Balmorhea in Reeves County. The park is owned and managed by the Texas Parks and Wildlife Department. It was built by the Civilian Conservation Corps (CCC) in the early 1930s and was opened as a state park in 1968. The entire spring head was converted into a concrete-lined swimming pool. The outflow from the pool is completely contained in concrete irrigation channels.

In 1996, Texas Parks and Wildlife created the San Solomon Ciénega which uses some spring flow to recreate more natural aquatic habitats for the benefit of the endangered fishes in the Park (McCorkle et al. 1998, Garrett 2003). It was designed to function like the original ciénega for the native aquatic fauna. The District and the local community it represents agreed to provide the essential water needed to create a secure environment for the endangered species. The main purpose of this restoration project was to recreate vital habitat, not only for the two endangered fishes, but for other aquatic, terrestrial, and wetland-adapted organisms as well (McCorkle et al. 1998, Garrett 2003).

The artesian spring issues from the lower Cretaceous limestones at an elevation of 1,020 meters (3,346 feet). Although long-term data are scarce, San Solomon Spring flows have declined somewhat over the history of record, but not as much as Phantom Lake Spring (Schuster 1997, Sharp et al. 1999). Some recent declines in overall flow have likely occurred due to drought conditions and declining aquifer levels (Sharp 2003). San Solomon Spring discharges are usually in the 560 to 850 lps (20 to 30 cfs) range (Ashworth et al. 1997, Schuster 1997) and are consistent with the theory that the water bypassing Phantom Lake Spring discharges at San Solomon Spring.

Giffin Spring: This spring is located less than 1.6 kilometers (one mile) west, across State Highway 17, from Balmorhea State Park. Access is restricted because the spring is on private property. Brune (1981) documented a gradual decline in flow from Giffin Spring between the 1930s and 1970s, but surprisingly the discharge has remained near constant, within outflow of about 85 to 115 lps (3 to 4 cfs) in recent times (Ashworth et al. 1997). The outflow channel has been modified (dammed and channelized) to accommodate irrigation for downstream canals. The snail likely still occurs here, but has not been confirmed.

East Sandia Spring: East Sandia Spring is located approximately 3.2 kilometers (2 miles) east of Balmorhea near the community of Brogado. The springs are included in a 97-hectare (240-acre) preserve owned and managed by The Nature Conservancy (Karges 2003). A significant sacaton

grassland is associated with the habitat included on the site.

Flows from East Sandia Spring are likely from a shallow groundwater source as water chemistry differences indicate it is not directly connected with other Toyah Basin springs (San Solomon Spring, Phantom Lake Spring, Giffin Spring) in the nearby area (LaFave and Sharp 1987; Schuster 1997). East Sandia Spring discharges at an elevation of 977 meters (3,224 feet) from alluvial sand and gravel (Schuster 1997). Brune (1981) noted that flows from Sandia Springs were declining. East Sandia may be very susceptible to over pumping in the area of the local aquifer that supports the spring. Measured discharges in 1995 and 1996 ranged from 12.7 to 115 lps (0.45 to 4.07 cfs) (Schuster 1997). The small outflow channel from East Sandia Spring has not been significantly modified and water flows into the District irrigation system about 100 to 200 meters (328 to 656 feet) after surfacing. West Sandia Spring also occurs on a preserve owned by The Nature Conservancy, but it ceased flowing in the past 10 years (Schuster 1997). The presence of rare species there is not likely.

Irrigation Canals: The District maintains an extensive system of over 97 kilometers (60 miles) of irrigation canals that provide minimal aquatic habitat for the native species. Most of the canals are concrete-lined with high velocities and little natural substrate available. Many of the canals are regularly dewatered as part of the normal District operations for water management.

Water Quality: Another threat to snail habitat is the potential degradation of water quality from point and nonpoint pollutant sources. This can occur either directly into surface water or indirectly through contamination of groundwater that discharges into spring run habitats used by the snail. The primary threat for contamination comes from herbicide and pesticide use in nearby agricultural areas.

The natural ciénega habitats of the Balmorhea area have been mostly altered over time to accommodate agricultural irrigation. Most significant was the draining of wetland areas and the modification of spring outlets for development of human use of the water resources. Although the physical condition of the areas has changed dramatically over time from human actions, at least a portion of the native biota remain. Two of the three known occurrences of the species are in degraded habitats (exception is East Sandia Spring) because the natural conditions of the springs have been substantially modified for human use. Any additional modifications to the spring flow habitats will further threaten the species.

B. Overutilization for commercial, recreational, scientific, or educational purposes. Not known to be a factor threatening the Phantom Cave snail.

C. Disease or predation. Not known to be a factor threatening the Phantom Cave snail.

D. The inadequacy of existing regulatory mechanisms. Texas State law provides no protection for this invertebrate species. There is no existing Federal, State or local regulatory mechanism providing protection for these species. The snail is afforded some protection indirectly due to the presence of two fishes (Comanche Springs (*Cyprinodon bovinus*) pupfish and Pecos gambusia (*Gambusia nobilis*)) listed as endangered by State and Federal governments that occupy similar habitats. However, the snail may be more sensitive to changes in water quality or

other habitat changes than the fish and are likely more directly threatened by the presence of the exotic *Melanoides* snail than the endangered fish.

Some protection for the habitat of this species is provided with the ownership of the springs by Federal (Phantom Lake) and State (San Solomon) agencies, and by The Nature Conservancy (East Sandia). However, this land ownership provides no protection for maintaining necessary groundwater levels to ensure adequate spring flows. Texas groundwater resources are under the "Rule of Capture," which provides little opportunity for regulation of pumping or management of groundwater resources (Potter 2004). Local underground water districts are the method for groundwater management in Texas. Although there are three groundwater districts in the area that could manage groundwater to protect spring flows, generally groundwater districts will not limit groundwater use to allow for conservation of surface water flows (Booth and Richard-Crow 2004, Caroom and Maxwell 2004).

E. Other natural or manmade factors affecting its continued existence. Within the last 10 years, an exotic snail, *Melanoides* sp., has become established in Phantom Lake Spring (B. Fullington, *in litt*., 1993; McDermott 2000). The species has been at San Solomon Spring for some time longer, but is not found in East Sandia Spring. In many locations at San Solomon Spring, this exotic snail essentially is the substrate in the small stream channel. The effects of this introduction are not known. However, this exotic snail is likely competing with the native snails for space and resources. Other changes to the ecosystem from the dominance of this species are likely to occur and could have detrimental effects to the native invertebrate community.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED: The Service has had a long and active partnership with the Reeves County Water Improvement District #1, the Texas Parks and Wildlife Department, The Nature Conservancy, Bureau of Reclamation, and others, in conservation of the endangered fishes that occur in the springs and irrigation system in the Balmorhea area of Reeves and Jeff Davis counties. Texas Parks and Wildlife owns and manages Balmorhea State Park, not only for the benefit of visitors, but also for the conservation of the rare and protected aquatic species. The San Solomon Ciénega project by the Texas Parks and Wildlife Department, the District, and a host of other cooperators was a significant step in conservation of the area's aquatic biota (McCorkle et al. 1998). Texas Parks and Wildlife Department provides some management assistance to the Bureau of Reclamation for maintenance of the property at Phantom Lake Spring.

The Service has been working with Texas Parks and Wildlife Department and the Bureau of Reclamation to maintain the aquatic habitat at Phantom Lake Spring through the installation and maintenance of a pumping system there. Section 6 funds are currently being used to upgrade this pumping system to continue this project.

The Service also funded through section 6 to the Texas Water Development Board a regional groundwater study to investigate the source waters of the area springs and determine the causes for declines at Phantom Lake Spring. The results were not conclusive and the final report is under revision by the Texas Water Development Board and is anticipated to be completed by December 2004.

SUMMARY OF THREATS: The primary threat to this species is the loss of surface flows due to declining groundwater levels from drought and pumping for agricultural production. Although much of the land immediately surrounding their habitat is owned and managed by The Nature Conservancy, Bureau of Reclamation, and Texas Parks and Wildlife Department, the water needed to maintain their habitat has declined due to a reduction in spring flows, possibly as a result of private groundwater pumping in areas beyond that controlled by these landowners. As an example, Phantom Lake Spring, one of the sites of occurrence, has already ceased flowing and aquatic habitat is supported only by a pumping system.

For species that are being removed from candidate status:

___Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	2*
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Threats of spring flow loss will result in complete habitat loss and permanent elimination of all populations of the species.

Imminence: Drying of Phantom Lake Spring is happening now and will likely extirpate this population in the near future. Declining spring flows in San Solomon Spring are also becoming evident and will impact that spring site as well within the foreseeable future.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? Emergency listing of the Phantom Cave snail is not warranted

at this time. Because the snail is sympatric with the two endangered fishes, it benefits from any conservation actions that have been and are being undertaken to recover the fishes. In addition, the nature of the main threat of spring flow loss is not a straightforward enforcement action under the Endangered Species Act, and, therefore, emergency listing of the Phantom Cave snail is not likely to afford them immediate protection that would either alleviate the threats or prevent extinction.

DESCRIPTION OF MONITORING: Service personnel have monitored the habitat at Phantom Lake Spring (maintained by a pumping system) over the last few years and confirmed presence of the Phantom Cave snail several times per year. Spring habitats are generally monitored by Texas Parks and Wildlife Department and The Nature Conservancy at San Solomon and East Sandia springs, respectively. Flows from San Solomon Spring are monitored by U.S. Geological Survey, U.S. Bureau of Reclamation, and the District on a continual basis.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Texas

Indicate which State(s) did not provide any information or comments: NA

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Rich McDonald 11/17/2005
Acting Regional Director, Fish and Wildlife Service Date

Concur: August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do not concur:
Director, Fish and Wildlife Service Date

Date of annual review: October 13, 2005
Conducted by: Nathan Allan